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VERSATILE HIGH PERFORMANCE HOLOGRAPHIC OPTICAL COATINGS

Jeffrey B. Shellan
JBS Technologies, Inc.
631 Kendale Ln.
Thousand Oaks, CA 91360
N00014-90-C-0145
(805) 496-0144

Conventional Holographic Coatings (HC) have been fabricated for use in high energy lasers, integrated optics, and in filters designed to reduce background clutter in surveillance and laser radar systems. In most of these cases, the coatings are nearly periodic and designed to reflect radiation over a narrow spectral bandwidth. The goal of the current program is to develop a relatively simple technique for fabricating HC's with nearly any desired reflectivity spectral profile. These components could be used as matched filters to greatly increase the signal-to-clutter ratio (SCR) in tracking and surveillance. Dim targets viewed against low contrast backgrounds could be more easily detected using these filters, if the target and backgrounds had different spectral profiles.

Conventional fabrication of HCs cannot produce coatings with an arbitrary spectral profile. Figure 1 illustrates one approach for fabricating the complex HCs needed for arbitrary matched filters. A laser, after reflection from a turning mirror ("rotating mirror"), is used to record a reflection hologram. For a fixed incident angle of the beam on the holographic recording material, the developed hologram will only reflect strongly at one particular incident wavelength. In one version of the proposed concept, the turning mirror is rotated during the HC exposure, thus generating a continuum of different holographic grating periods within the photosensitive material. The intensity of the recording laser is modulated during the exposure in order to produce a HC with a specified reflectivity profile. In the second approach being investigated, the hologram is only exposed at several discrete angles, rather than a continuum of angles. This would normally produce a "comb" reflectivity profile, as shown in figure 2a. It is possible, however, to expose and then develop the photosensitive material to produce a series of chirped coatings so that the desired reflectivity profile can be approximated (figure 2b).

If the matched filter HCs can be produced, they can be used to improve the detection of targets (e.g. boosters or even aircraft against an Earth background) or background material of interest (e.g. specific vegetation or minerals from satellites).

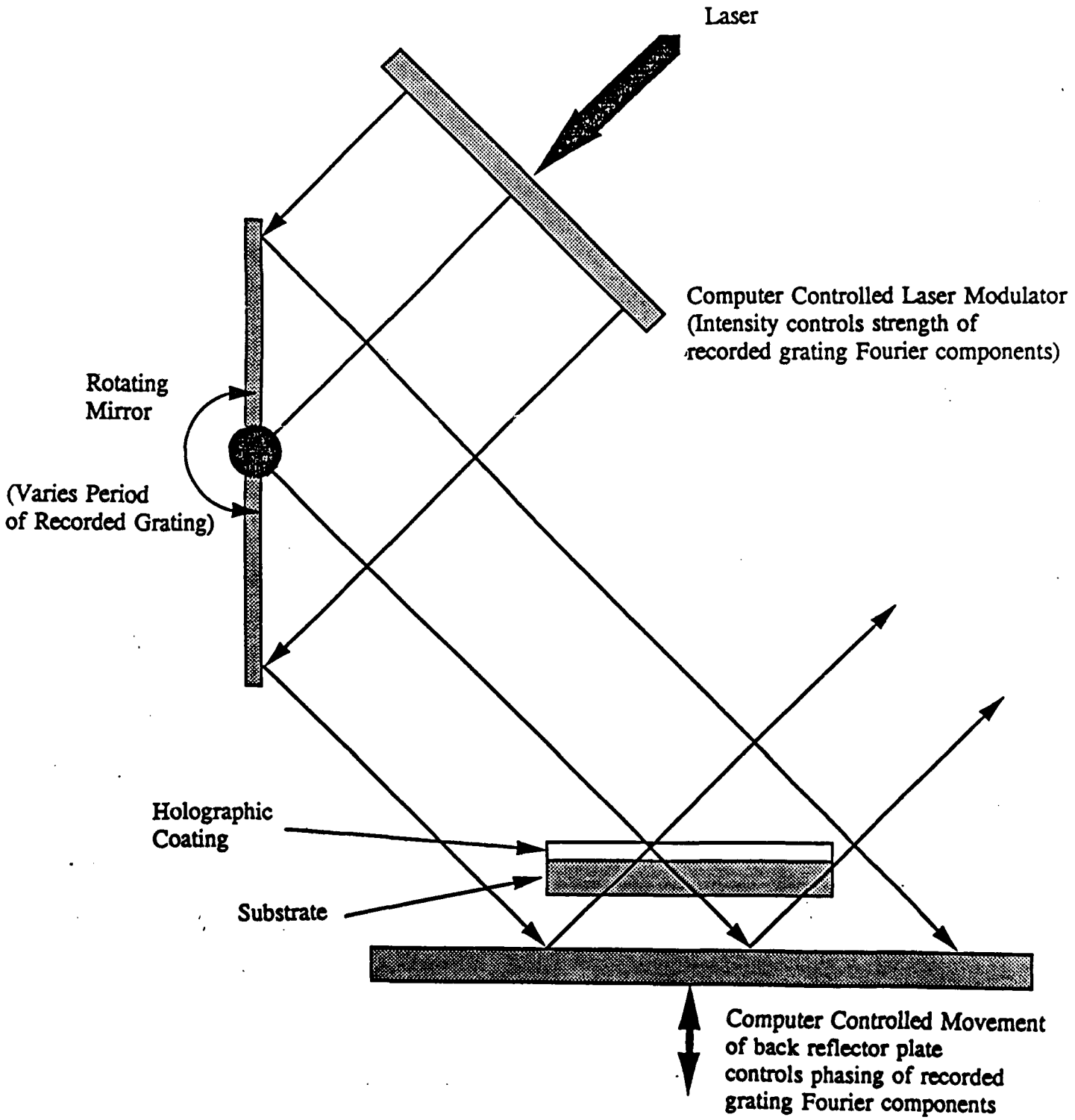

Figure 1. Holographic Matched Filter Recording Concept for Improved Target Detection Capability.

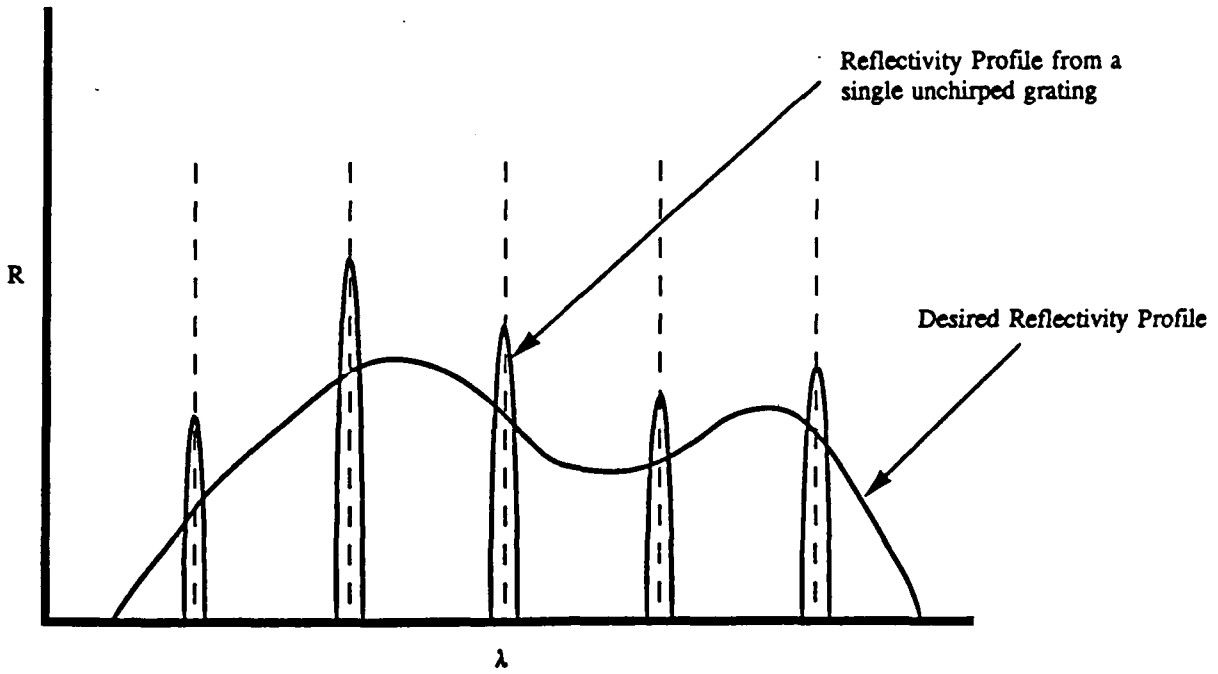

Figure 2a

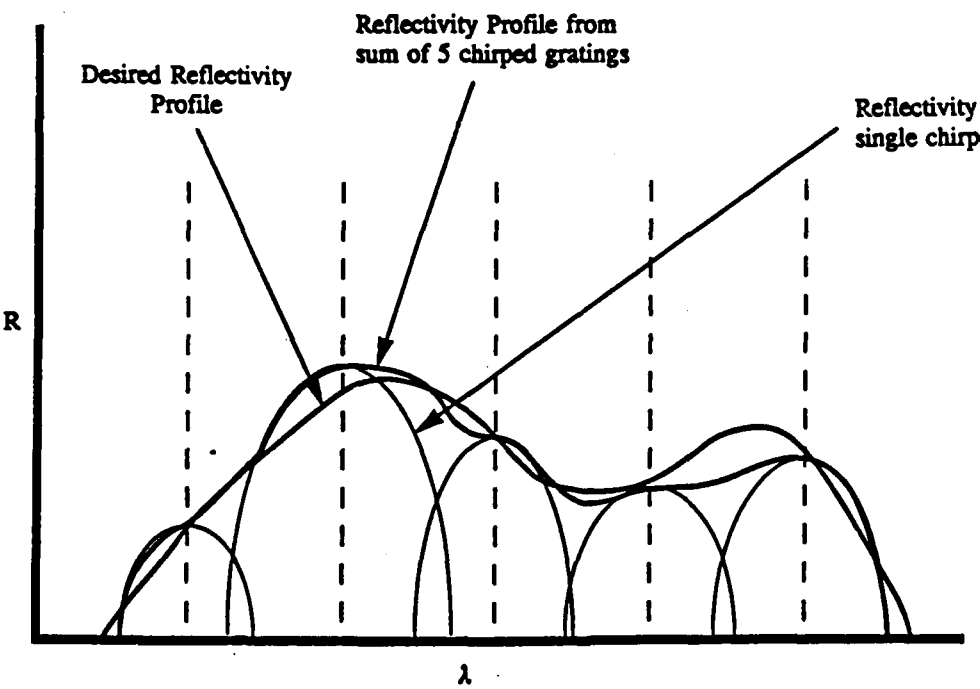

Figure 2b

Figure 2. **Conventional recording and development of a series of holographic gratings cannot be used to accurately represent a desired spectral reflectivity profile (Figure 2a). Novel techniques for recording and development of gratings with a chirped profile allow the convenient fabrication of filters with any desired reflectivity profile (Figure 2b).**

MATERIAL INSPECTION AND RECEIVING REPORT

1. PROC. INSTRUMENT IDEN. (CONTRACT)	(ORDER) NO.	6. INVOICE	7. PAGE	OF
N00014-90-C-0145			1	1
			8. ACCEPTANCE POINT	
			D	

2. SHIPMENT NO.	3. DATE SHIPPED	4. B/L	5. DISCOUNT TERMS
JBS 0001	7-30-90	TCN	Net 30

9. PRIME CONTRACTOR	CODE	10. ADMINISTERED BY	CODE
JBS Technologies, Inc. 631 Kendale Lane Thousand Oaks, CA 91360	0DR86	DCASMA Van Nuys 6230 Van Nuys Blvd. Van Nuys, CA 91401-2713	S0512A

11. SHIPPED FROM (If other than 9)	CODE	FOB:	12. PAYMENT WILL BE MADE BY	CODE
			DFC/Van Nuys P.O. Box 182157 Columbus, OH 43218-2157	

13. SHIPPED TO	CODE	14. MARKED FOR	CODE
Scientific Officer Office of Naval Research Attn: Dr. Erhard Schimitschek, Code 12614 Ref: Contract N00014-90-C-0145 800 North Quincy St., Arlington, VA 22217-5000	N00014		

15. ITEM NO.	16. STOCK/PART NO. DESCRIPTION (Indicate number of shipping containers - type of container - container number.)	17. QUANTITY SHIP / REC'D *	18. UNIT	19. UNIT PRICE	20. AMOUNT
0001	The contractor shall furnish the necessary personnel and facilities to conduct research as described in Section C.				
0001 AA	Progress Report	1	ea.	$15,689.00	$15,689.00

21. PROCUREMENT QUALITY ASSURANCE

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